

REMARKS

Claims 1-15 are pending in the present application. Claim 1 is herein amended. No new matter has been entered. It is respectfully submitted that this Amendment is fully responsive to the Office Action dated December 14, 2006.

Claim Rejections - 35 U.S.C. 102

Claims 1, 2 and 11 were rejected under 35 U.S.C. 102(e) as anticipated by *Sun et al.* (U.S. Pat. No. 2004/0168705 A1).

Applicants respectfully disagree with the Examiner's characterization of the cited reference. However, to expedite prosecution and clarify the subject matter of the present invention, Applicants hereby amend claim 1 to recite that nitrogen gas and water in a liquid phase are concurrently sprayed on the surface of the interconnection layer. *See* claim 1. Support for this amendment is found, for example, in the description from page 14, line 25 to page 15, line 18 (e.g., carbonated water, ozonized water having ozone dissolved in water, and hydrogen functional water containing a prescribed concentration of hydrogen ions, are enumerated as examples of water for the nitrogen-two-fluid processing, clearly showing that water sprayed concurrently with nitrogen gas is in a liquid phase.) Accordingly, in view of this amendment and the following remarks, Applicants respectfully request that the Examiner withdraw the anticipation rejection of claims 1, 2 and 11.

Anticipation requires the disclosure in a single prior art reference of each and EVERY element of the claimed invention, arranged as in the claim. However, *Sun et al.* does NOT

describe a method for fabricating a semiconductor device comprising the step of *concurrently spraying nitrogen gas and water in a liquid phase on the surface of the interconnection layer buried in the opening*. Instead, as described below, *Sun et al.* discloses a different plasma process from the present invention according to claim 1.

For example, in *Sun et al.*, one or more process gases are used for removing a reducible contaminant layer. The one or more process gases comprise a reducing gas and at least one suppressant gas useful for suppressing the reactions between the reducing gas and a dielectric layer exposed to the reducing gas. The process gas may further comprise a sputtering gas for enhancing the removal of the contaminant layer. It is described that the suppressant gas may comprise water vapor (the second sentence from the last in [0040]) and the sputtering gas may comprise nitrogen (the last sentence in [0042]).

Thus, the Examiner has improperly characterized the water vapor and nitrogen included in process gases in *Sun et al.* as the nitrogen gas and water concurrently sprayed in the present invention. However, *Sun et al.* does not use water in a fluid phase but uses water vapor as a suppressant gas. Namely, *Sun et al.* uses water in a gas phase, which is completely different from water in liquid phase sprayed concurrently with nitrogen gas in the present invention.

Furthermore, in *Sun et al.*, the contaminant layer is exposed to reducing species and suppressant species from plasma of the process gas. That is, one or more process gases are introduced into a vacuum chamber 111 of RPC apparatus 102 shown FIG. 2 or the applicator 52 of the remote plasma source 50 shown FIG. 1 ([0039]). The process gases are ignited into a plasma in the chamber 11 by a high frequency power applied to the antenna 125 ([0046]).

Otherwise, the process gases flow through the applicator 52 and ignited into a plasma within the applicator 52 ([0027]). Thus, it is clear that *Sun et al.* only discloses the treatment of the contaminant layer with plasma of the process gas and never discloses the treatment with nitrogen gas and water themselves. *Sun et al.* discloses a mere dry process using plasma which has nothing to do with a wet process concurrently spraying nitrogen gas and water in a liquid phase.

In addition, the Examiner pointed out that the water being carbonated water or ozonized water recited in claim 11 is disclosed in paragraph [0044]. However, paragraph [0044] has nothing to do with the Examiner's assertion regarding claim 11, since nothing but the settings regarding the pressure and the temperature of the chamber and the flow rate of process gases etc. are described in paragraph [0044]. Instead of paragraph [0044], as examples of suppressant gases, carbon dioxide gas and water vapor are described in paragraph [0040]. It is no doubt that the mixture of carbon dioxide gas and water vapor *cannot be interpreted as carbonated water* (e.g., a material in a liquid phase is different from the material in a gas phase.)

As explained above, *Sun et al.*, fails to teach the step of concurrently spraying nitrogen gas and water in a liquid phase on the surface in the present invention, Accordingly, it is evident that the present invention according to claim 1 and its dependent claims 2 and 11 is distinct from *Sun et al.* and is therefore NOT anticipated by *Sun et al.*

Claim Rejections - 35 U.S.C. 103

Claims 3, 8-9, 12 and 13 were rejected under 35 U.S.C. 103(a) as unpatentable over *Sun et al.* in view of *Ngo et al.* (U.S. Pat. No. 6,472,755 B1). Claims 7 and 15 were rejected under 35

U.S.C. 103(a) as unpatentable over *Sun et al.* Claims 5 and 6 were rejected under 35 U.S.C. 103(a) as unpatentable over *Sun et al.* in view of *Ngo et al.* and further in view of *Li et al.* (U.S. Pat. No. 2004/0219795 A1). Claims 4, 10 and 14 were rejected under 35 U.S.C. 103(a) as unpatentable over *Sun et al.* in view of *Li et al.*

Applicants disagree with the Examiner's reasons for rejecting the aforementioned claims as being obvious. As described above, claim 1 is NOT anticipated by *Sun et al.* Therefore, even if *Sun et al.* were further combined with *Ngo et al.* and/or *Li et al.*, the present invention according to these dependent claims would NOT have been obvious to one of ordinary skill in the art at the time the invention was made.

Furthermore, regarding claim 12 and 13, the Examiner argues that the limitation of "the water to be concurrently sprayed with the nitrogen gas is carbonated water or ozonized water" is disclosed in col. 7, lines 5-10 of *Ngo et al.* However, col. 7, lines 5-10 only discloses that water used in double-sided brush scrubbing after CMP is de-ionized water, which has completely nothing to do with water concurrently sprayed with nitrogen gas. Namely, de-ionized water used in double-sided brush scrubbing after CMP is for scrubbing out particles generated during CMP, having no effect of removing any oxide layer. However, de-ionized layer is NOT equivalent to carbonated water and ozonized water.

Accordingly, in view of the above remarks, Applicants respectfully request that the Examiner withdraw the obviousness rejections of the aforementioned claims.

Application No. 10/816,958
Attorney Docket No. 042323

Amendment under 37 C.F.R. §1.111
Amendment filed: March 14, 2007

Conclusion

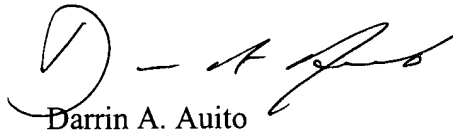
In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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A handwritten signature in black ink, appearing to read "Darrin A. Auito", is written over the printed name.

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